

Alaska Industry Council

June 2010



**Federal Aviation
Administration**



AGENDA

- Opening Remarks – **Jere Hayslett**
- Navigation Services Update – **JoAnn Ford**
- Surveillance and Broadcast Services Update – **Jere Hayslett**
- Round Table - **All**



Crow Creek Pass 6,000 ft.

Alaska Industry Council

By: JoAnn Ford

Date: June 9, 2010



Federal Aviation
Administration



Navigation Services Update Profile

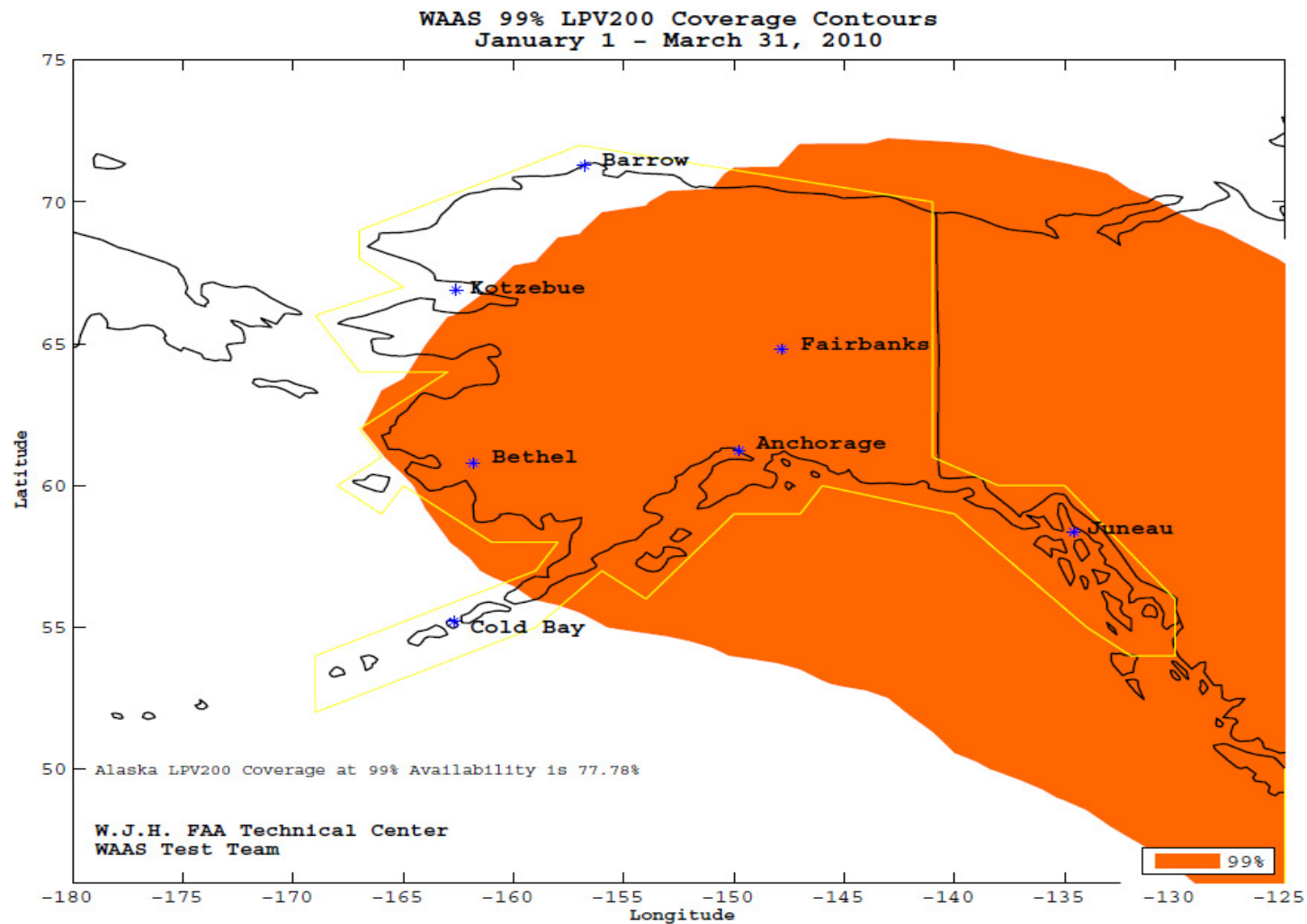
- **Service Volume**
 - All coverage charts in this presentation can be found at:
<http://www.nstb.tc.faa.gov>
- **NAS and Alaska Published LPVs**
- **Status of:**
 - WAAS Aircraft Equipage
 - WAAS GEO **Galaxy** 15 Issues
 - LPV Surveys for Alaska

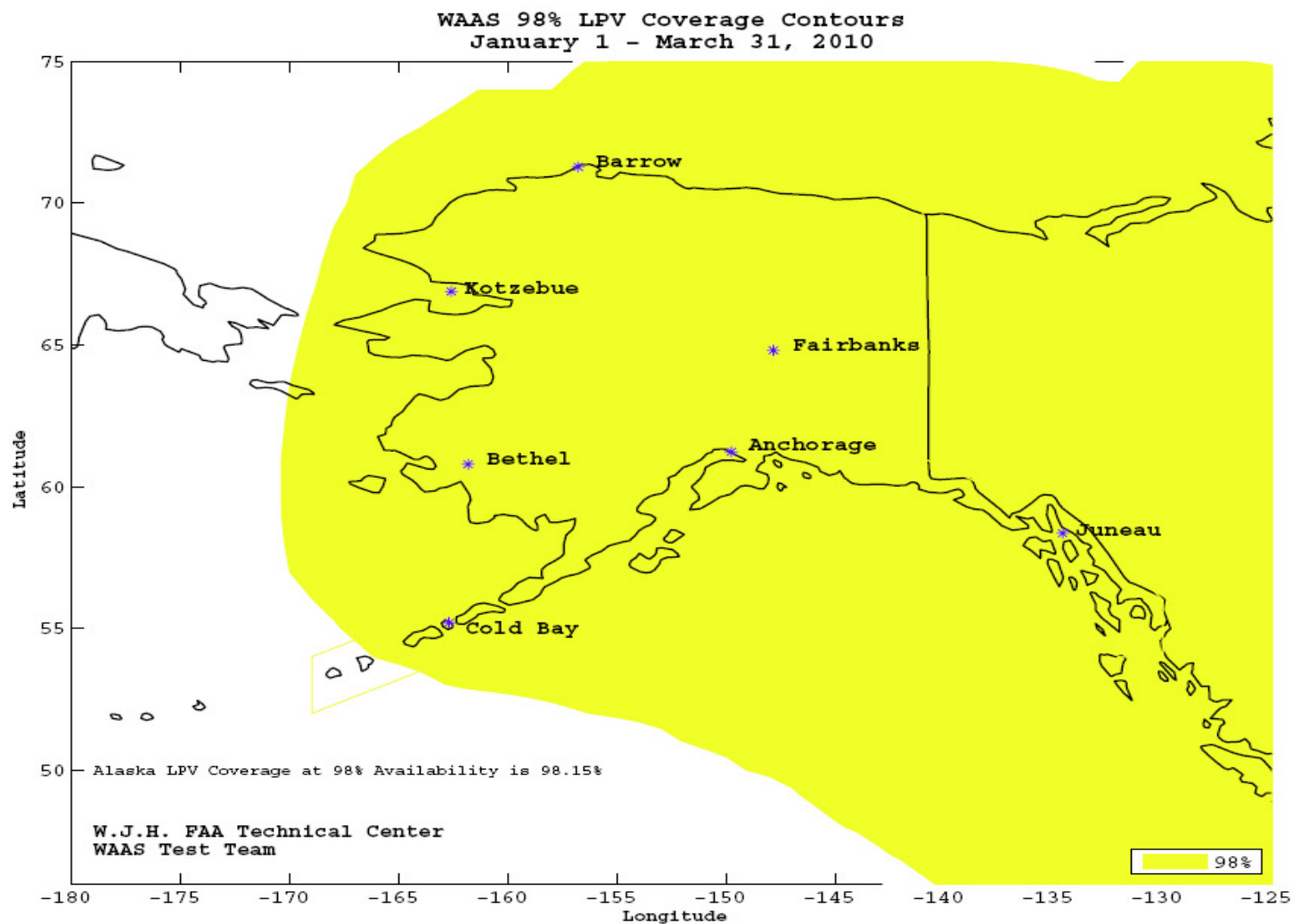


2009 - 2013 Program Goals

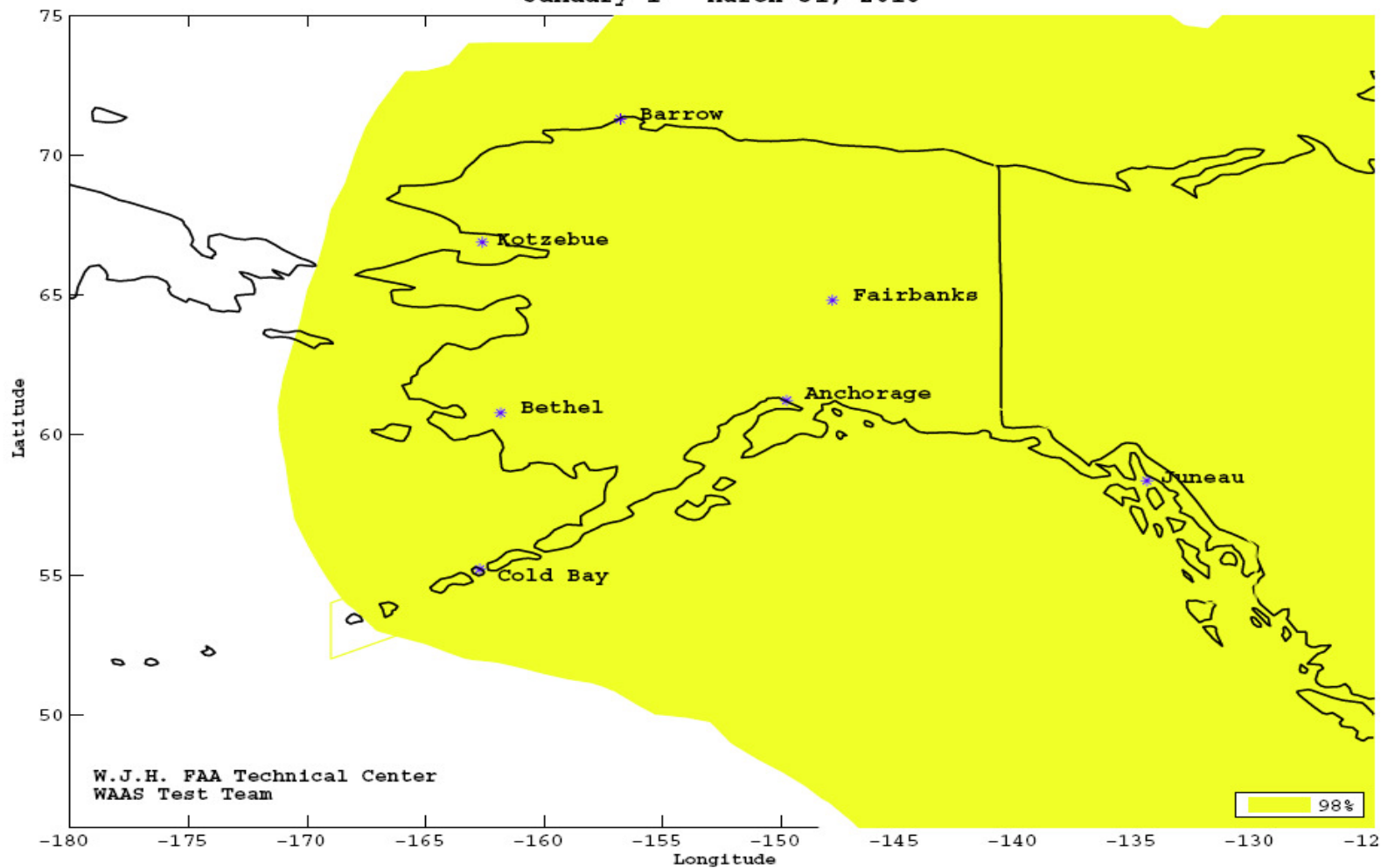
- **Increased Safety, Reduce general aviation fatalities**
 - Develop and publish 500 WAAS Approach Procedures (LPV & LP) Per Year
 - Increase Access via Precision Approach to all qualifying runways in the NAS
- **NextGen Initiatives**
 - Enabler of Automatic Dependent Surveillance Broadcast (ADS-B) Terminal Services
 - Enabler of Position Navigation and Timing (PNT) Services for
 - Area Navigation /Required Navigation Performance (RNAV/RNP) Routes and Procedures to Support Flexibility in Terminal Environment, Increased Arrival/Departures at High Density Airports, Trajectory Based Operations
- **RNP/RNAV Helicopter Departure Procedures**
 - Development of low altitude IFR vertical flight infrastructure system
 - Develop WAAS LPV Point In Space Procedures
- **Reduced Accidents in Alaska**
 - Implement an improved statewide public RNAV/RNP WAAS-enabled route structure in Alaska
 - Publish RNAV LPV/LP approach procedures to runways in Alaska



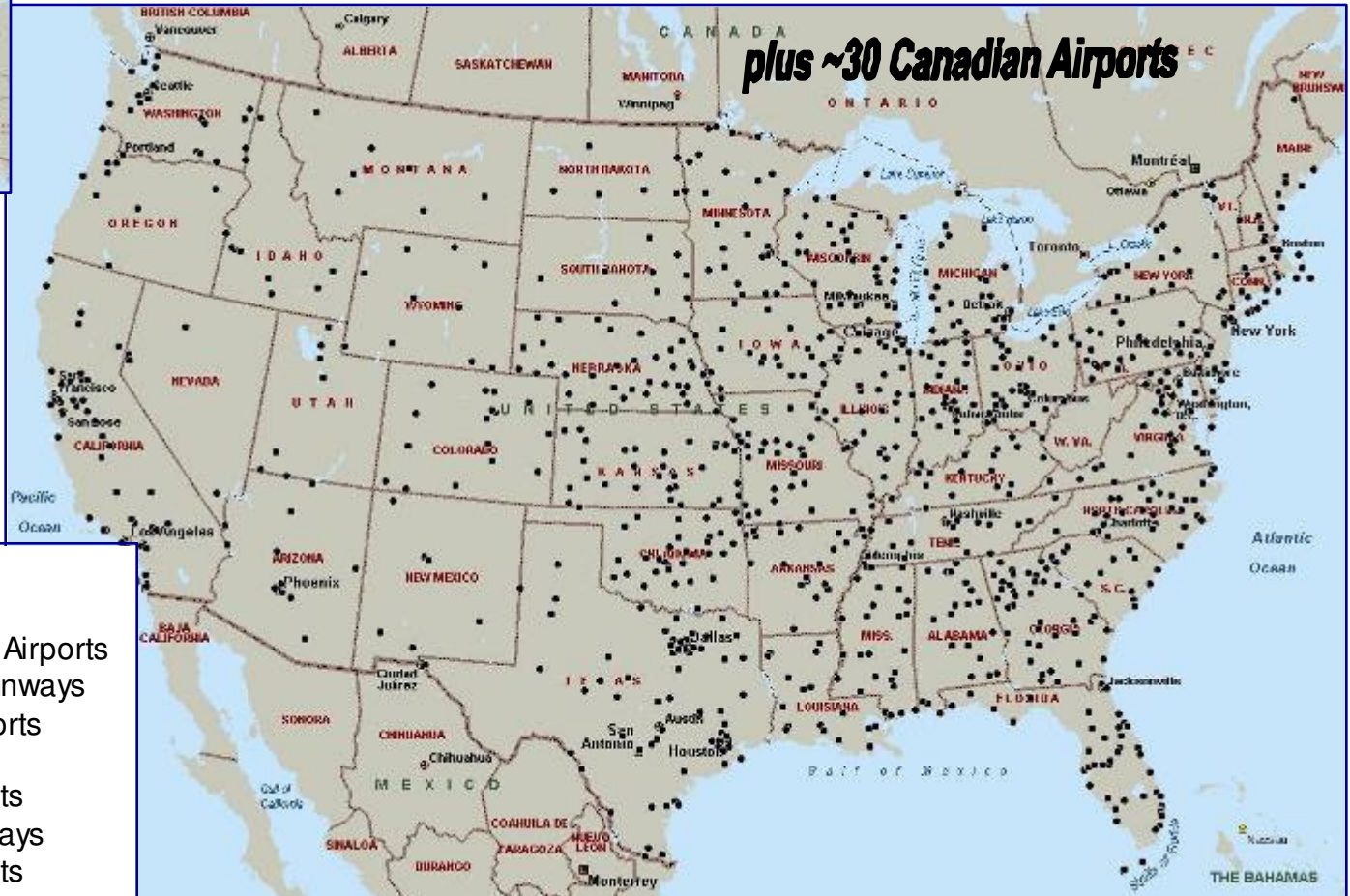




WAAS 98% LP Coverage Contours
January 1 - March 31, 2010



Airports with WAAS LPV Instrument Approaches



As of June 3rd, 2010

NAS

- 2,126 LPVs serving 1,126 Airports
- 1,284 LPVs to non-ILS Runways
- 829 LPVs at non-ILS Airports

Alaska

- 57 LPVs serving 31 Airports
- 43 LPVs at non-ILS Runways
- 33 LPVs at non-ILS Airports

LPV Procedures Published to Date

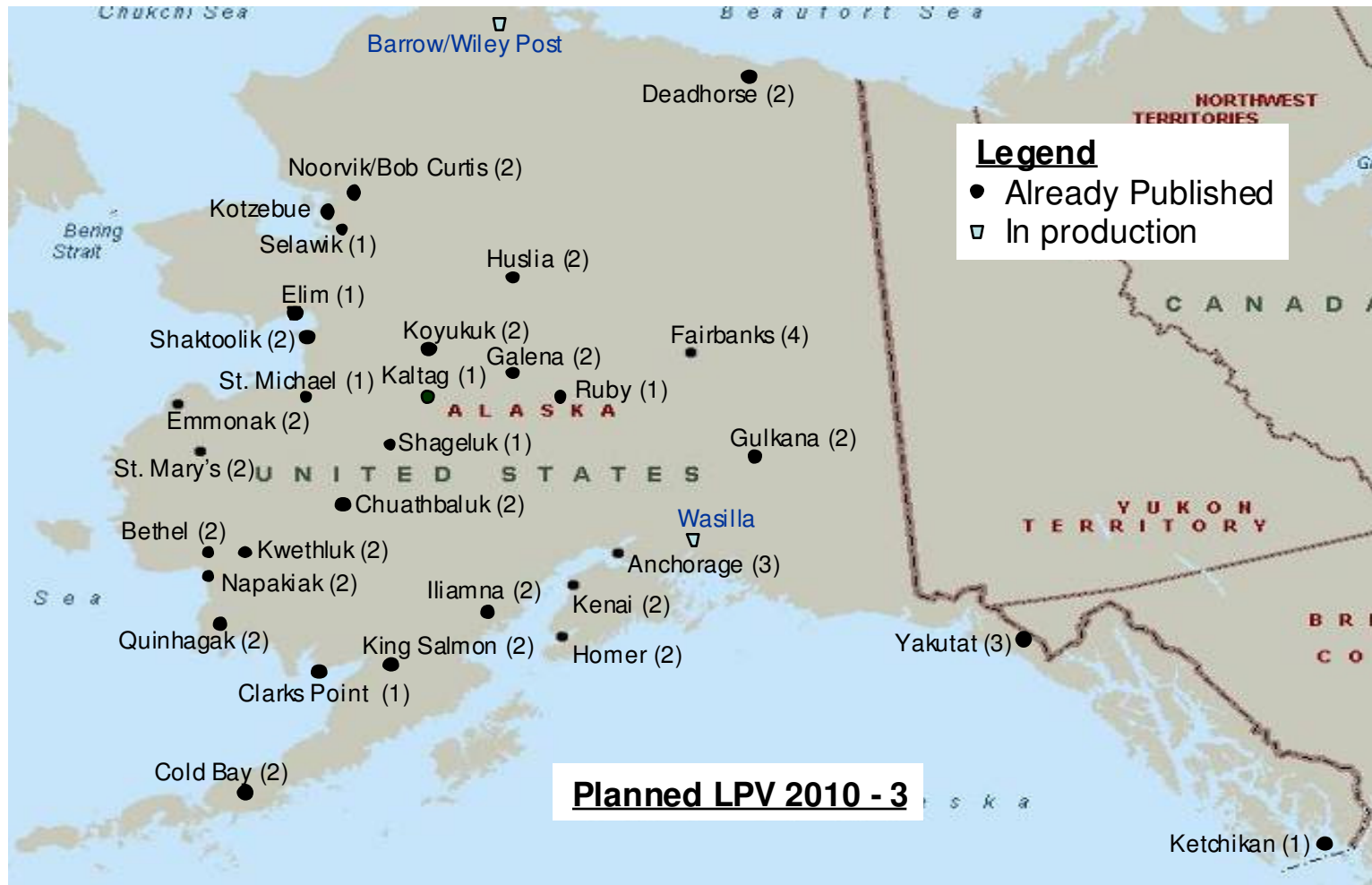
(Current and all prior years)

LPVs Published to non-ILS Runways	1284
LPVs Published to ILS Runways	<u>842</u>
Cumulative LPVs Published to Date	2,126
 LPVs Published to <250' Decision Altitude	 306

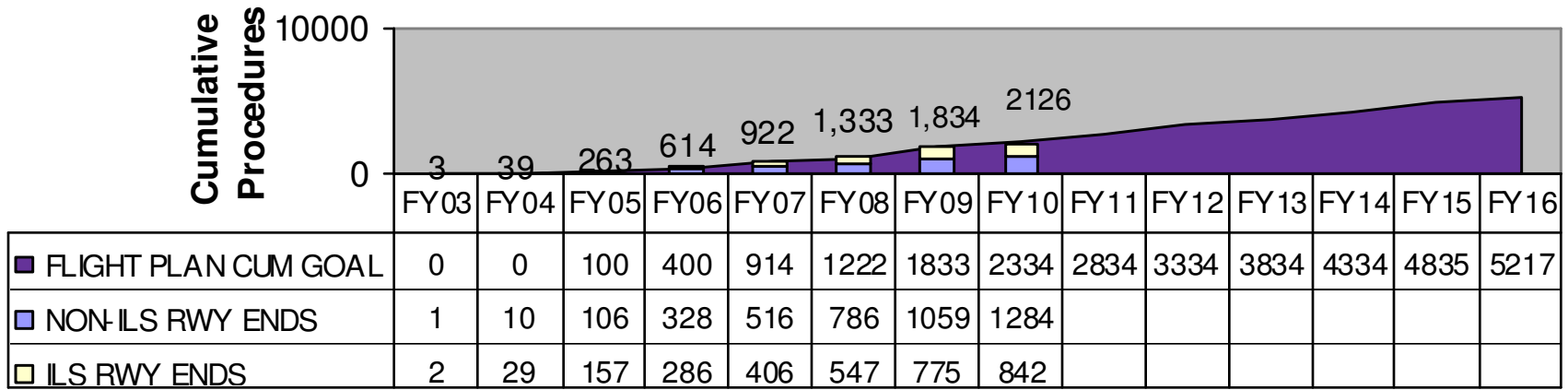
As of 03 June 2010



Alaska Airports with WAAS LPV Instrument Approaches thru June 03, 2010



Annual LPV Production Status



Annual Production Totals

	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10
Non-ILS Runway Ends	1	9	95	222	188	270	273	235
ILS Runway Ends	2	27	126	129	120	141	227	60
Total LPV per year	3	36	221	351	308	411	501	295

Alaska LPV Approaches

- **Total 57 - Current LPV approaches (as of 06/03/2010)**
- **Current LPV List next Slide**

(Ref source: AVN website: includes LPVs from all sources of FAA and AIP funding, private and public approaches)



Alaska LPV Approaches

Total 57 - Current LPV approaches (as of June 3, 2010)

Anchorage 3	Gulkana 2	Fairbanks 4
Homer 2	Ruby 1	Iliamna 2
Emmonak 2	Galena 2	Kaltag 1
St. Michaels 1	Huslia 2	Koyukuk 2
St. Mary's 2	King Salmon 2	Quinhagak 2
Yakutat 3	Ketchikan 1	Shaktoolik 2
Deadhorse 2	Bethel 2	Chuathbaluk 2
Kenai 2	Napakiaik 2	Noorvik 2
Selawik 1	Shageluk 1	Elim 1
Cold Bay 2	Kwethluk 2	Clarks Point 1
KOTZEBUE 1		



(SOURCE: AVN website: includes LPVs from all sources of FAA and AIP funding, private and public approaches)

Alaska Projected LPVs

- **07/29/10 PABR Barrow/Wiley Post-Will Rogers**
- **06/30/11 PAKU Kuparuk/Ugnu-Kuparuk**
- **05/05/11 PAWS Wasilla**



WAAS Equipage (list not all-inclusive)

- **GARMIN, Universal, Rockwell-Collins, Avidyne, Esterline/CMC and others**
- **Approx 35,000 Aircraft Equipped (TSO-145 or TSO-146)**
- **Approx 54,000 WAAS Receivers and Up- Graded Receivers purchased.**



Universal Avionics

Approved Acft LPV STCs

ATR-42/300	
B-727-200	First Air
Bombardier Q300	
Bombardier Q-400	Horizon
CL-600	
Cessna 560XL	
Challenger 600/601	UNS
Citation Bravo Series	
Citation V 560 Series	
Citation CE-650	
Citation Encore	
Citation Fleet	Transport Canada
Dash 8	Mid-Canada CTR
Falcon10	

Falcon 20D	
Falcon 20	
Falcon 50	
Falcon 2000	
Gulfstream II	
Lear 35 (C-21)	USAF
Lear 31A	
Lear 35	
Lear 35A	
Lear 45	
Lear 60	
MD-87	
Sabre 65	

Rockwell-Collins Acft LPV STCs

Approved

CRJ-200
Challenger 601-3A
Challenger CL-604
Citation Jet CJ-1+
Citation Jet CH-2+
Citation Jet CJ-3
Citation Encore+
Dassault Falcon 2000
Hawker-800XP
Hawker 900,800 and 750 series
KingAir-C90GTi,B200,300,and 350

Pending

Beechjet 400A
CRJ-700/900
Challenger CL-300
Challenger CL-605
Dassault Falcon 20
Dassault Falcon 50
Dassault Falcon 50EX
Dassault Falcon 2000/EX
Gulfstream G-150
Gulfstream G-200
Hawker-400XP



Honeywell/CMC TSO & STC Status

Approved *Avionics* LPV TSOs:

- Primus Epic FMS
- Primus APEX

Pending *Avionics* LPV TSOs:

- Primus 2000 (NZ-2000)
- EPIC (in other airframes)
- KSN 770 (for GA acft)

Approved *Aircraft* LPV STCs:

- Gulfstream G-450 & -550

Pending LPV STC Approvals:

- Gulfstream G-IV, G-V
- F-900B,-900EXC
- Challenger CL-601
- Hawker 900
- Citation X
- PC-12
- Viking
- Dassault EASy
- Cessna Sovereign

Additional Alaska Updates

- **Status of:**
 - WAAS GEO Galaxy 15
 - LPV Surveys

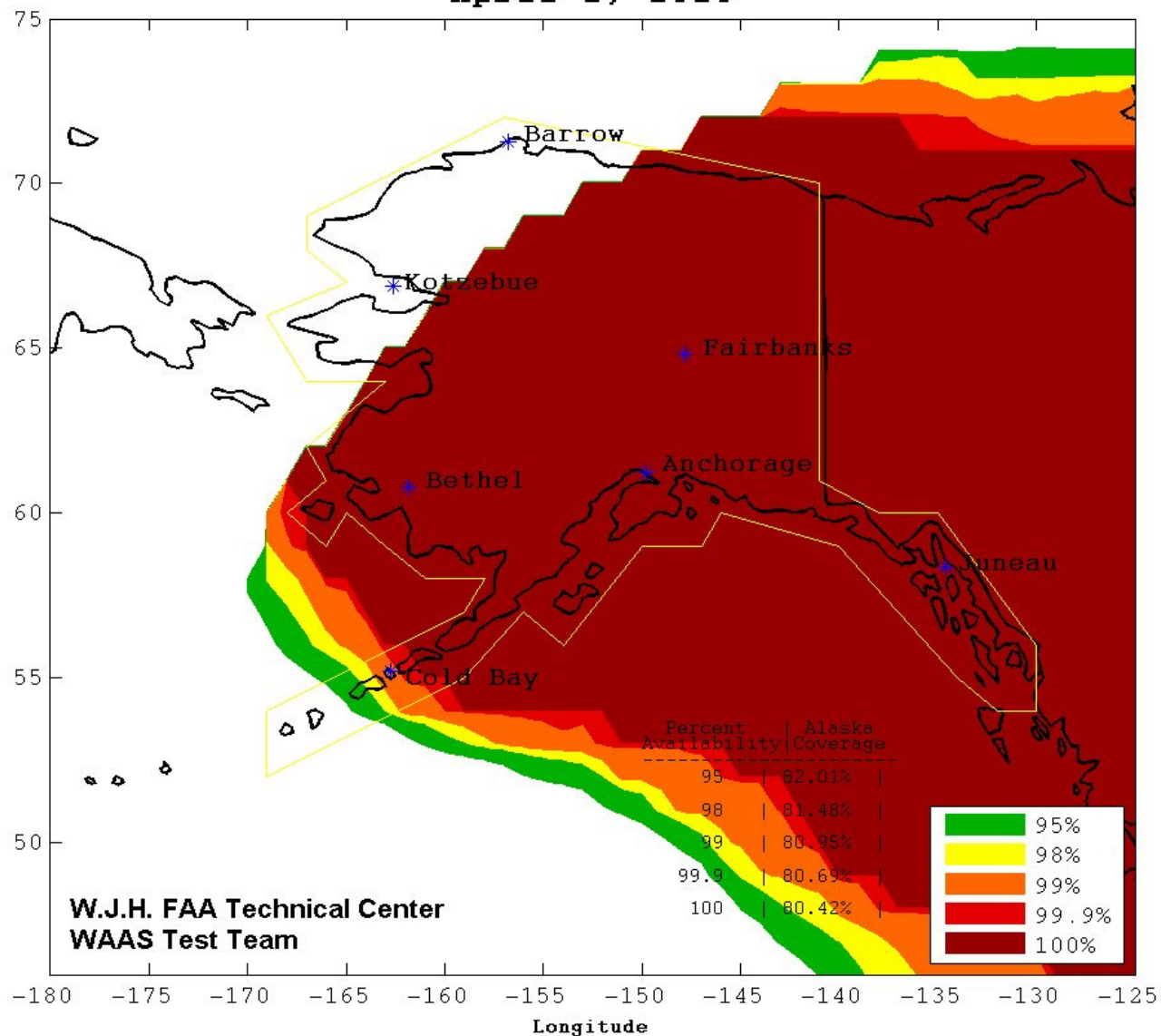


Issue

- **WAAS Currently Leases Two GEOs**
 - Intelsat (CRW) at 133 W
 - Telesat (CRE) at 107.3 W
- **Intelsat (CRW) TT&C Has Failed**
 - Provider Lost Ability to Control the GEO's Position on April 3rd
 - GEO Will Drift Out of Useable Orbit Over Next 2-4 Weeks
- **Loss of WAAS Service in NW Alaska is Imminent**
 - No Impact to LPV Service at the 16 Affected Airports
 - No LPV approaches published at these airports
 - LNAV Service Available Using GPS Only
 - Enroute/Terminal Service Including Q-Routes Available with Receiver Autonomous Integrity Monitoring (RAIM)
 - Users Will Need to Plan Around RAIM Availability
 - Requires a pre-flight RAIM prediction



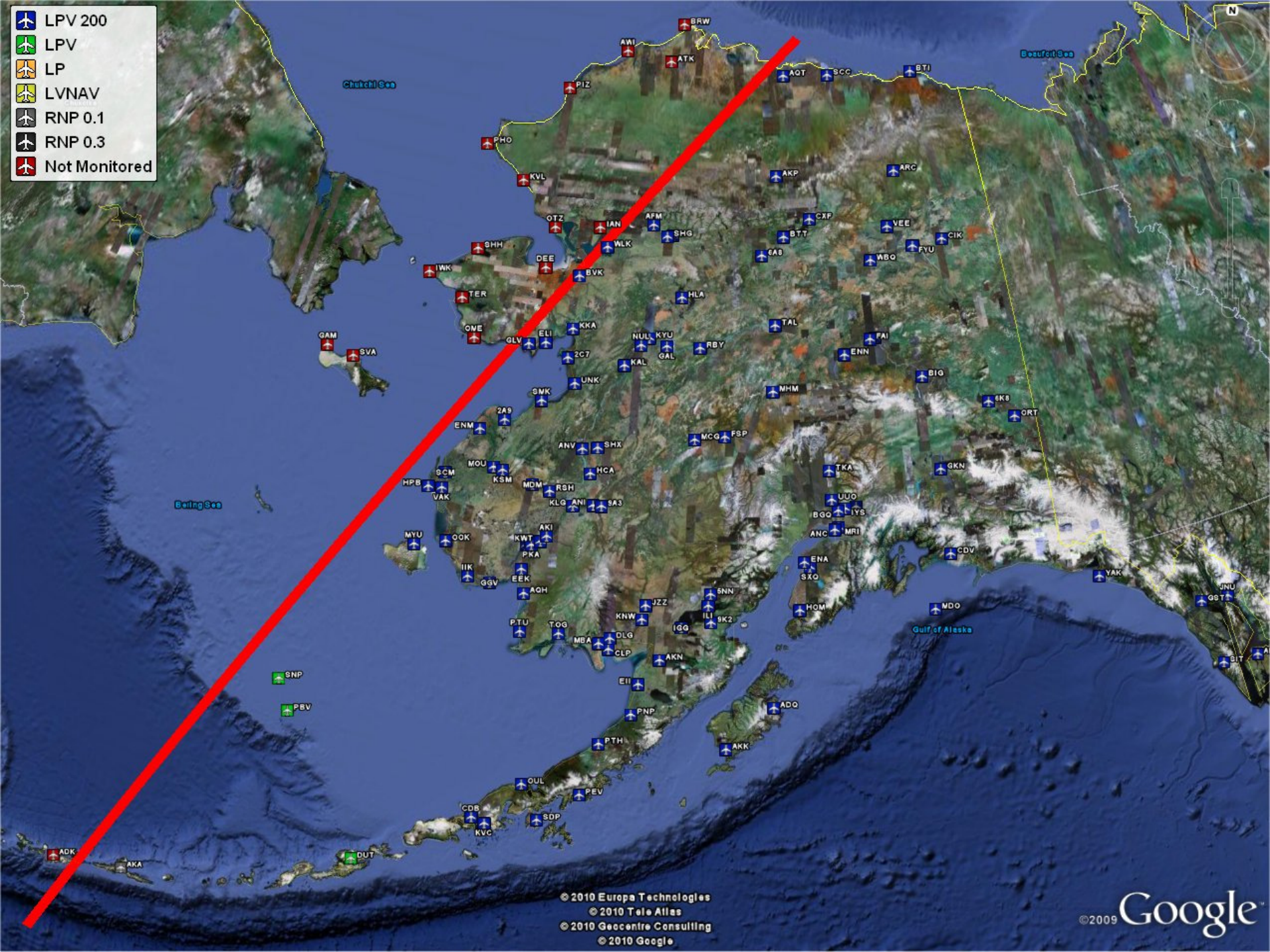
WAAS LPV Coverage Contours CRE Only April 1, 2010



NAS Impacts

- **Users Outside the Affected Area Will Continue to Have LPV service**
- **Due to Lack of Redundant GEO Coverage, WAAS Users May Experience Temporary Service Interruptions**
 - If WAAS GEO Uplink Station (GUS) Switchovers Occur
 - Potential to Occur 3-5 Times per Year
 - Up to 5 Minutes May be Required to Restore LPV Service
- **Single Point Failure Situation Exists Until Redundancy Restored**
 - WAAS Team Integrating Gap Filler GEO (AMR) at this Time
 - Planned for December 2010





- LPV 200
- LPV
- LP
- LVNAV
- RNP 0.1
- RNP 0.3
- Not Monitored

Alaska Airport Impacts

FAA ID	Name of Airport	Part 139	Runway	LPV Impact	Lowest GPS LNAV minima
ADK	Adak		23	N/A	1300 - 3
ATK	Atkasuk Edward Burnell Sr Memorial		06/24	N/A	400 - 1
AWI	Wainwright		23	N/A	400 - 1
BRW	Wiley Post-Will Rogers Memorial		24	N/A	400 - 1
DEE	Deering		02/11/20	N/A	600 - 1
GAM	Gambell		16/34	N/A	800 - 1
IAN	Bob Baker Mem.		06	N/A	1300 - 1 1/4
IWK	Wales		18	N/A	600 - 1
KVL	Kivalina		12/13	N/A	400 - 1
OME	Nome		28	N/A	400 - 3/4
OTZ	Ralph Wien Memorial		09	N/A	400 - 1
PHO	Point Hope		19	N/A	300 - 1
PIZ	Point Lay LRRS		05/23	N/A	400 - 1
SHH	Shishmaref		05	N/A	300 - 1
SVA	Savoonga		05	N/A	500 - 1
TER	Teller		07	N/A	800 - 1

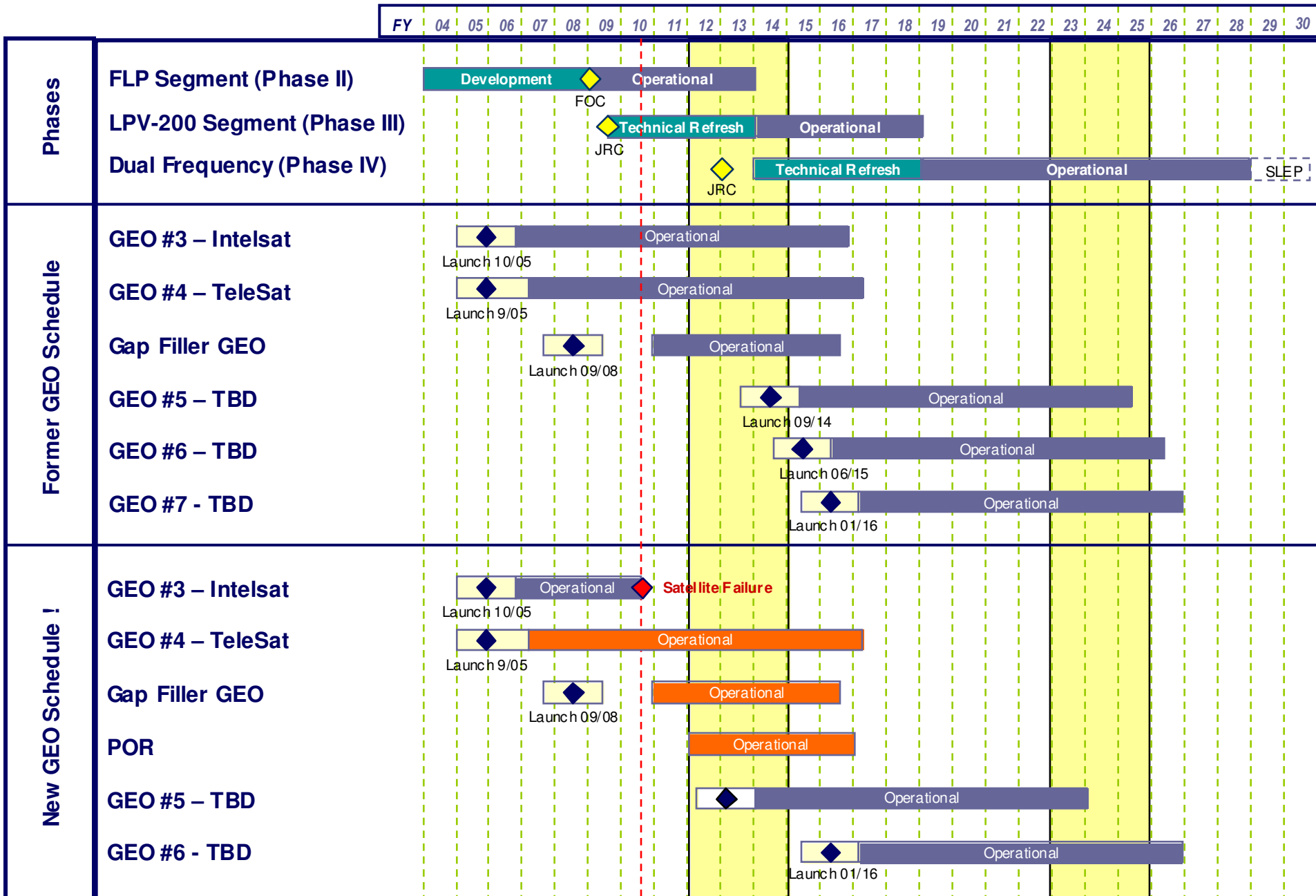


Mitigations

- **Investigate Integration of Inmarsat-III Pacific Ocean Region GEO**
 - Formerly used by WAAS Prior to Switching to Intelsat (CRW)
 - Lockheed Martin Working this with AJW-431
- **Accelerate Procurement of 5th GEO**
 - Will Replan Resources Saved from Loss of CRW
- **Publish Advisory NOTAM - Complete**
- **Publish Final NOTAM Prior to Loss of GEO**
 - Format and Content Being Coordinated with AFS
- **Investigate Accelerating Gap Filler GEO Integration**
 - Potential to Implement as Emergency Release



Updated WAAS Enterprise Schedule



Next Steps

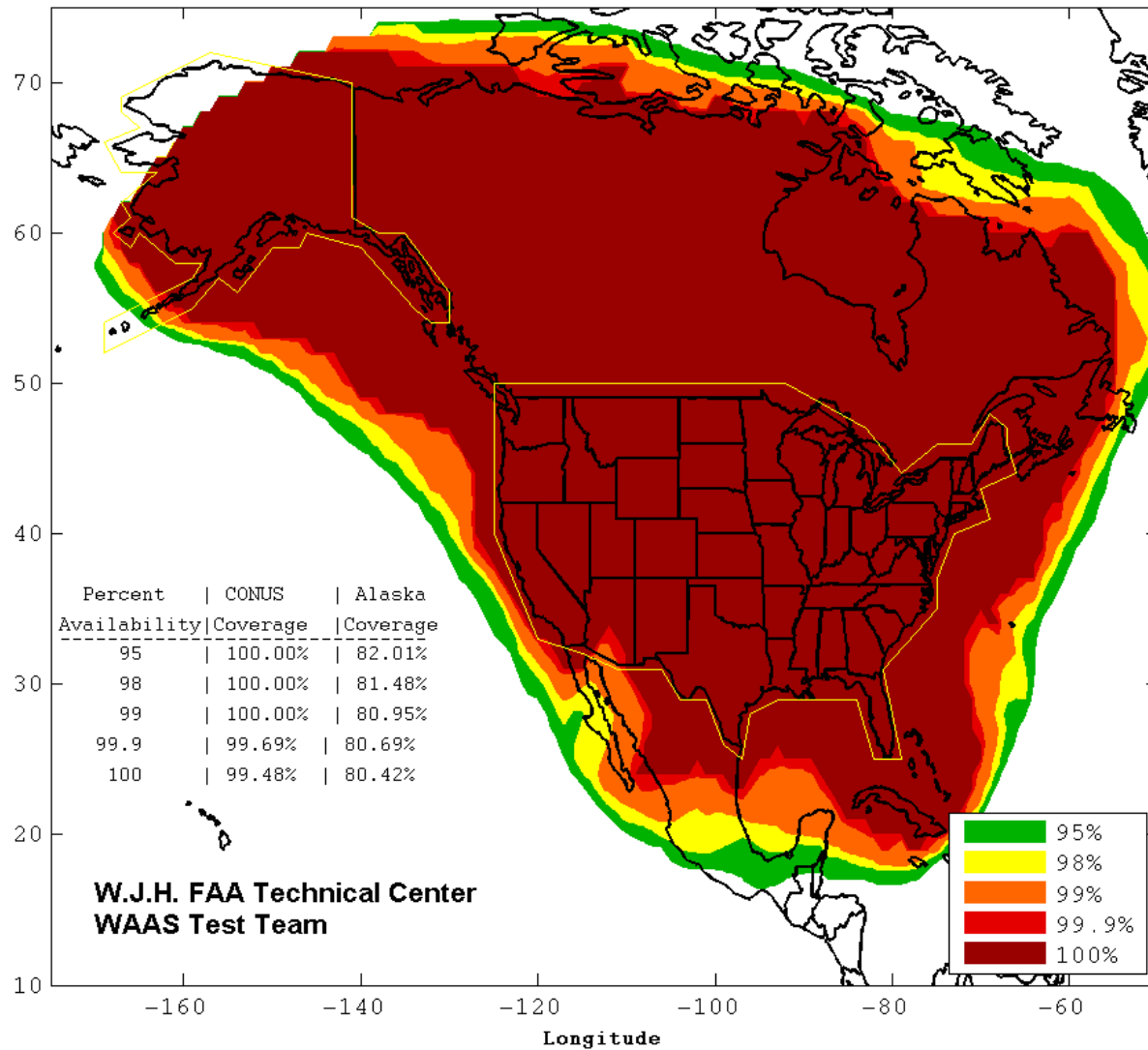
- **Continue to Monitor GEO Performance**
- **Determine Date to Issue Final NOTAMs**
- **Continue Action Plans for Mitigations**



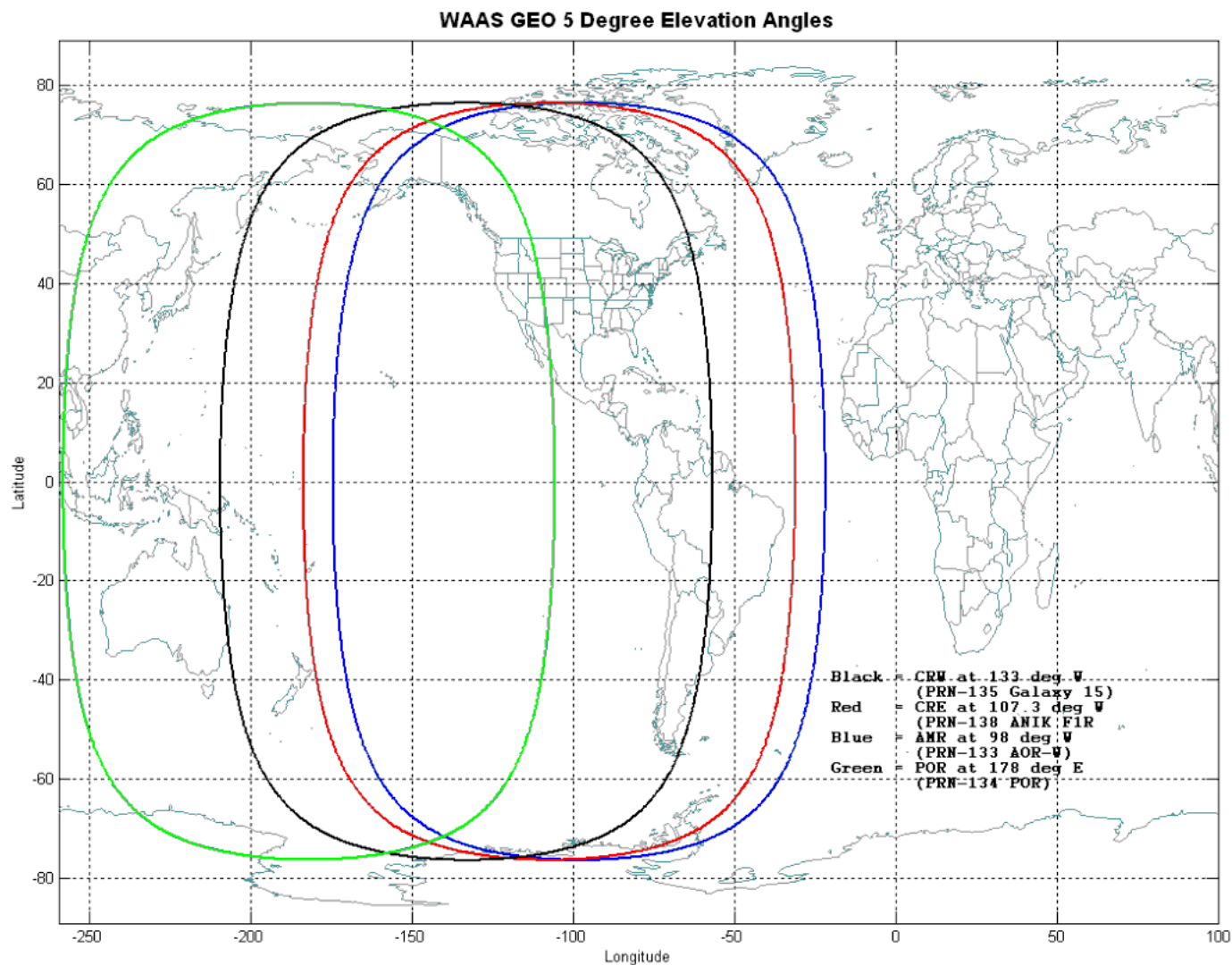
Backup Slides



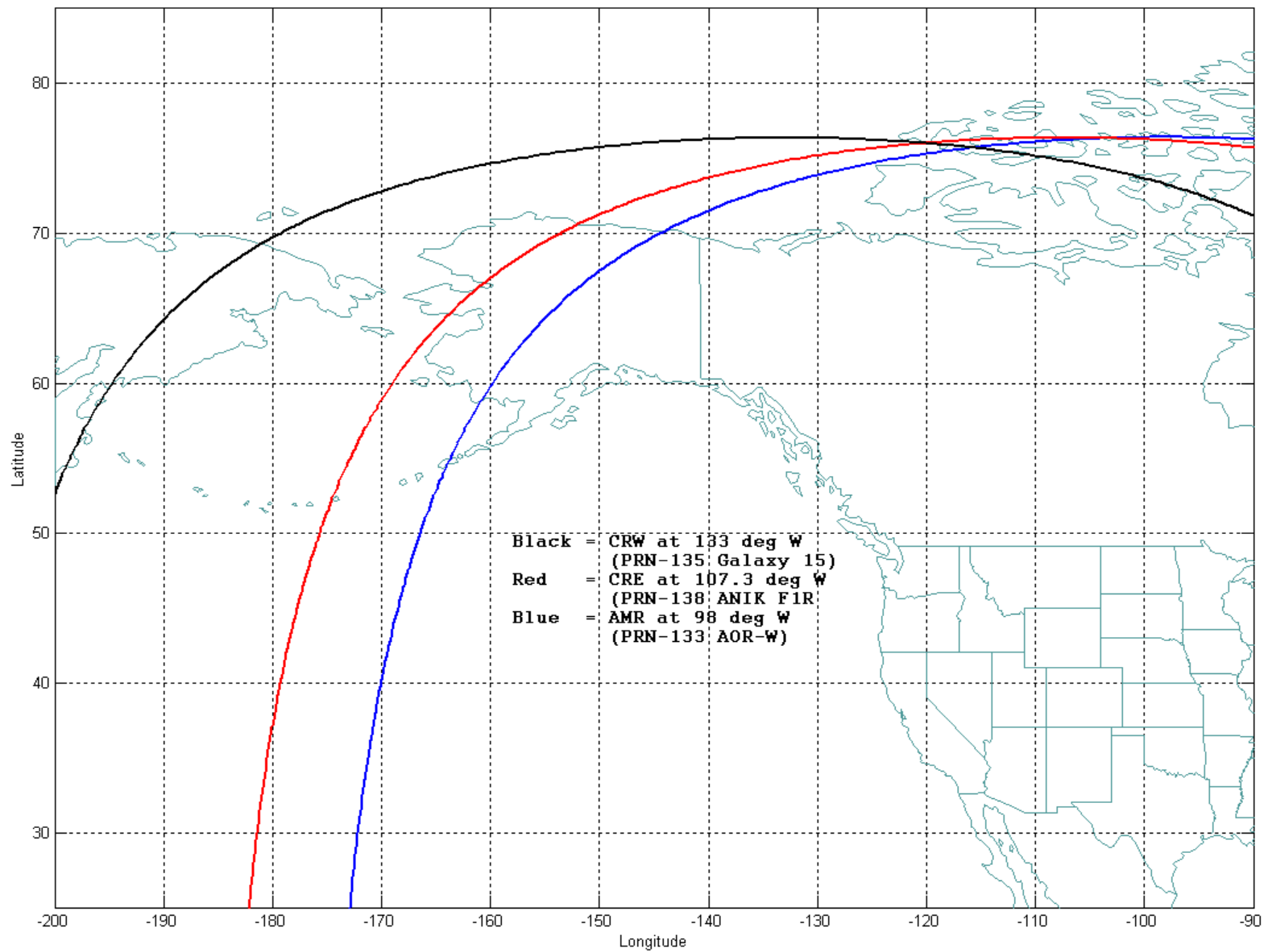
WAAS LPV Coverage Contours CRE Only April 1, 2010



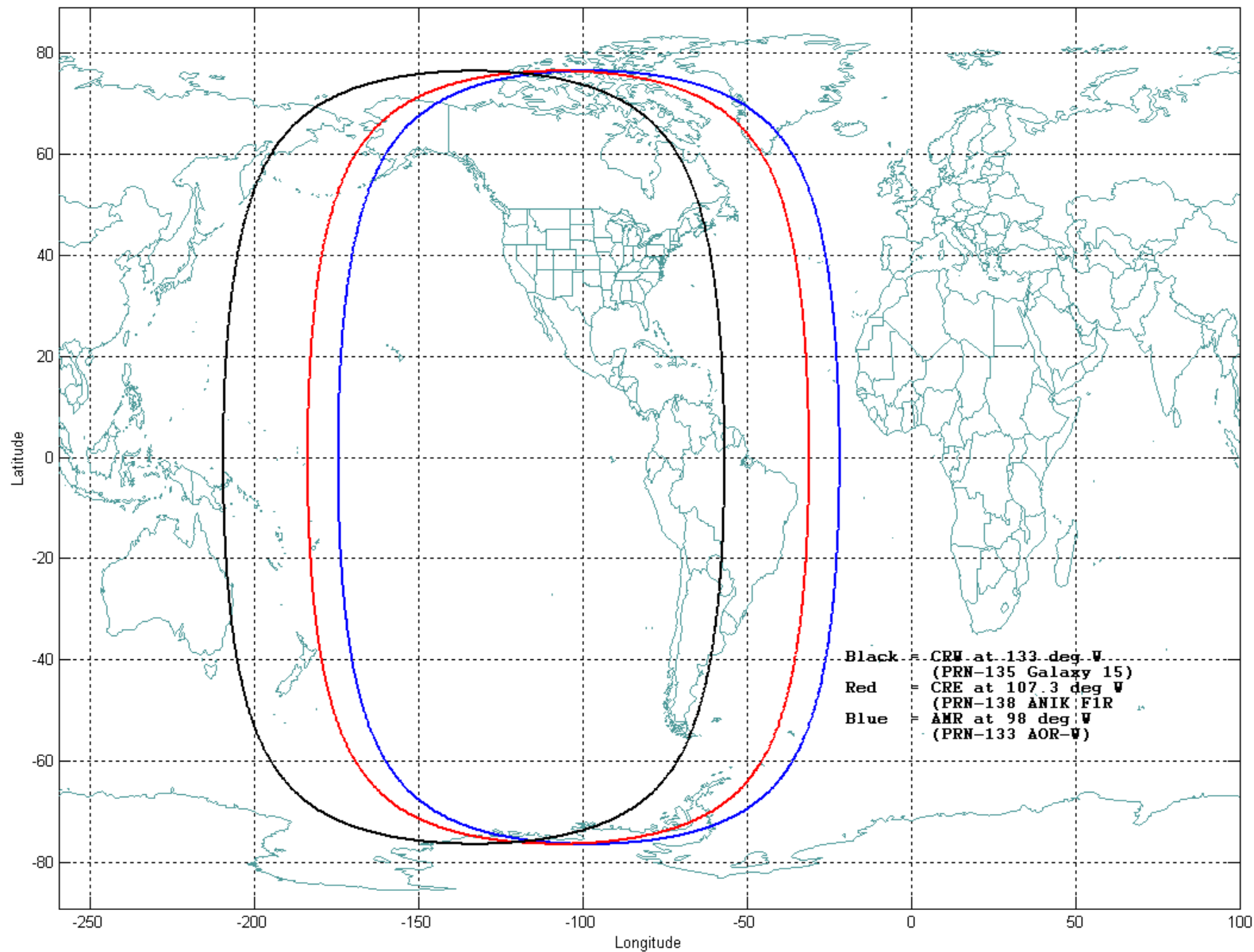
Inmarsat POR Alternative

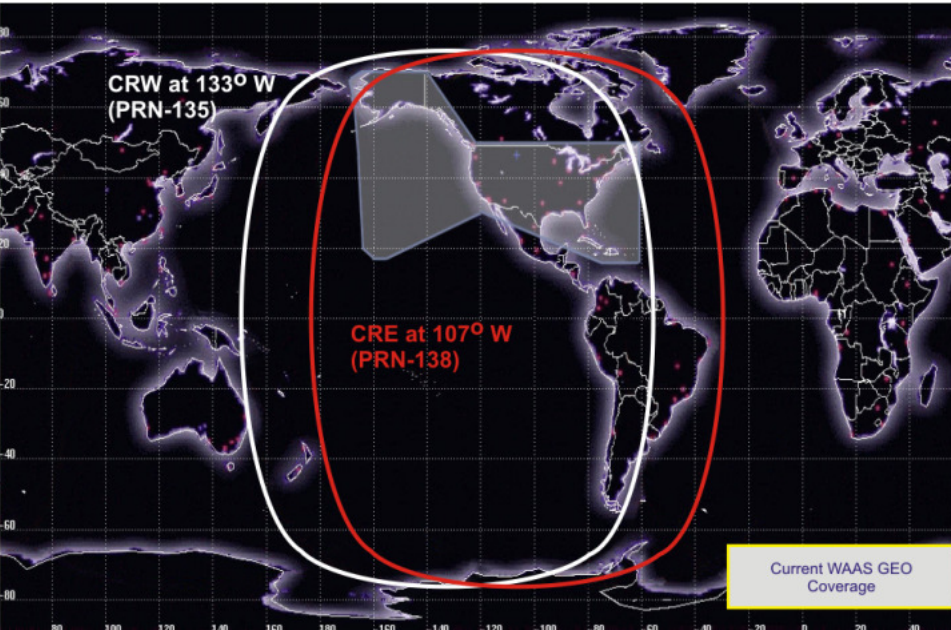


WAAS GEO 5 Degree Elevation Angles



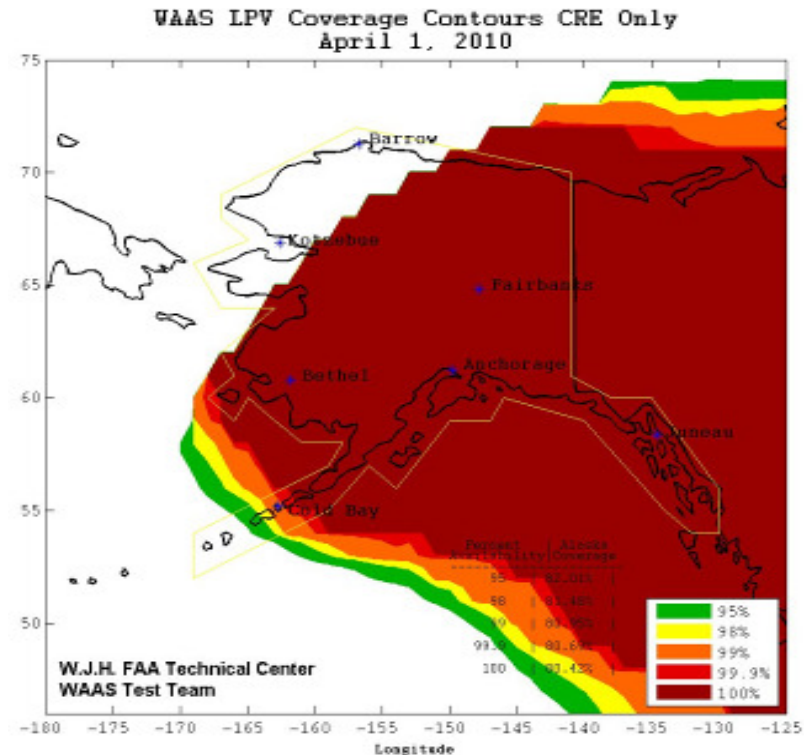
WAAS GEO 5 Degree Elevation Angles



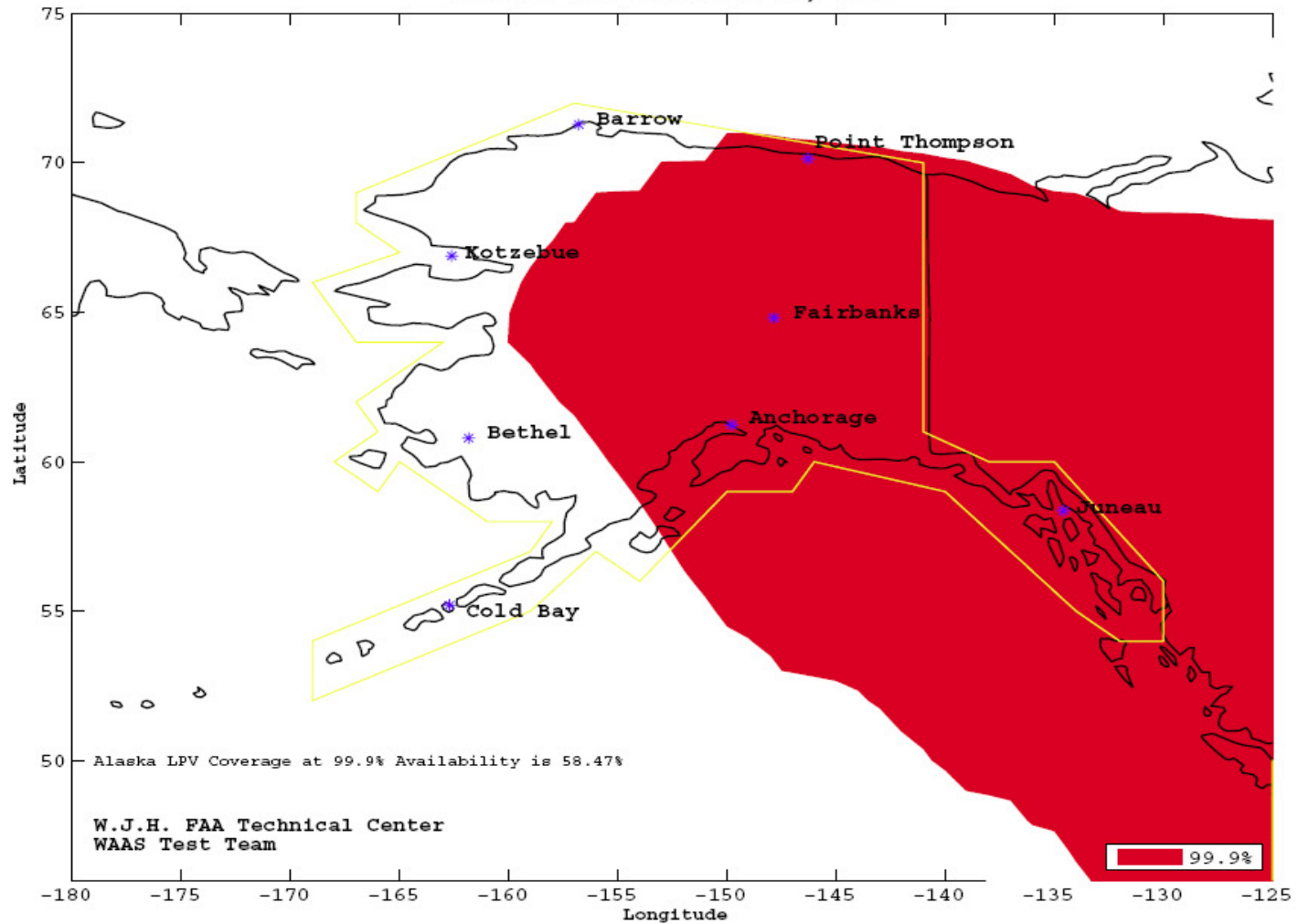


WAAS Service Impacts

- **Loss of GEO Coverage in NW Alaska**
 - WAAS Will Not Be Available
 - En route/Terminal Services are Still Available with Required RAIM Checks
- **Service Interruptions Within the Single GEO Coverage**
 - All WAAS Users Over the Entire NAS Will Experience Outages During GEO Uplink System Switchovers
 - Loss of Service for Up To 5 Minutes Per Event
 - May Occur Several Times Per Year



WAAS 99.9% LPV Coverage Contours
October 1 - December 31, 2009



Surveillance and Broadcast Services

Alaska Aviation Industry Council Meeting

By: Jere Hayslett

June 2010



**Federal Aviation
Administration**



Key Site Status

- **Essential Services**

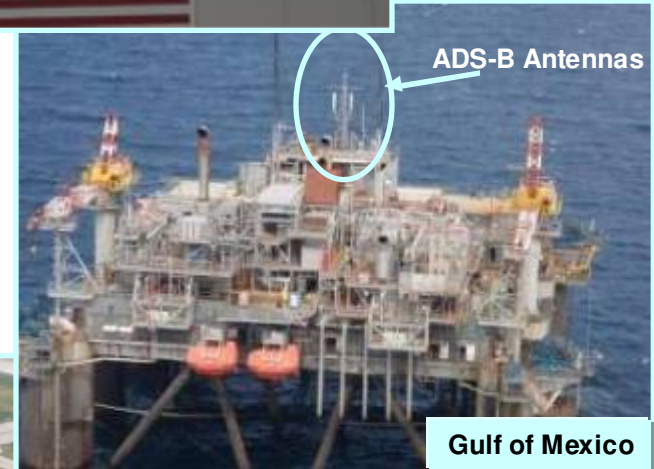
- Miami Area In Service Decision – November 2008 ✓

- **Critical Services**

- Louisville Initial Operating Capability (IOC) – November 2009 ✓
- Gulf of Mexico IOC – December 2009 ✓
- Philadelphia IOC – March 2010 ✓
- Juneau IOC – April 2010 ✓
- In Service Decision – September 2010



Louisville



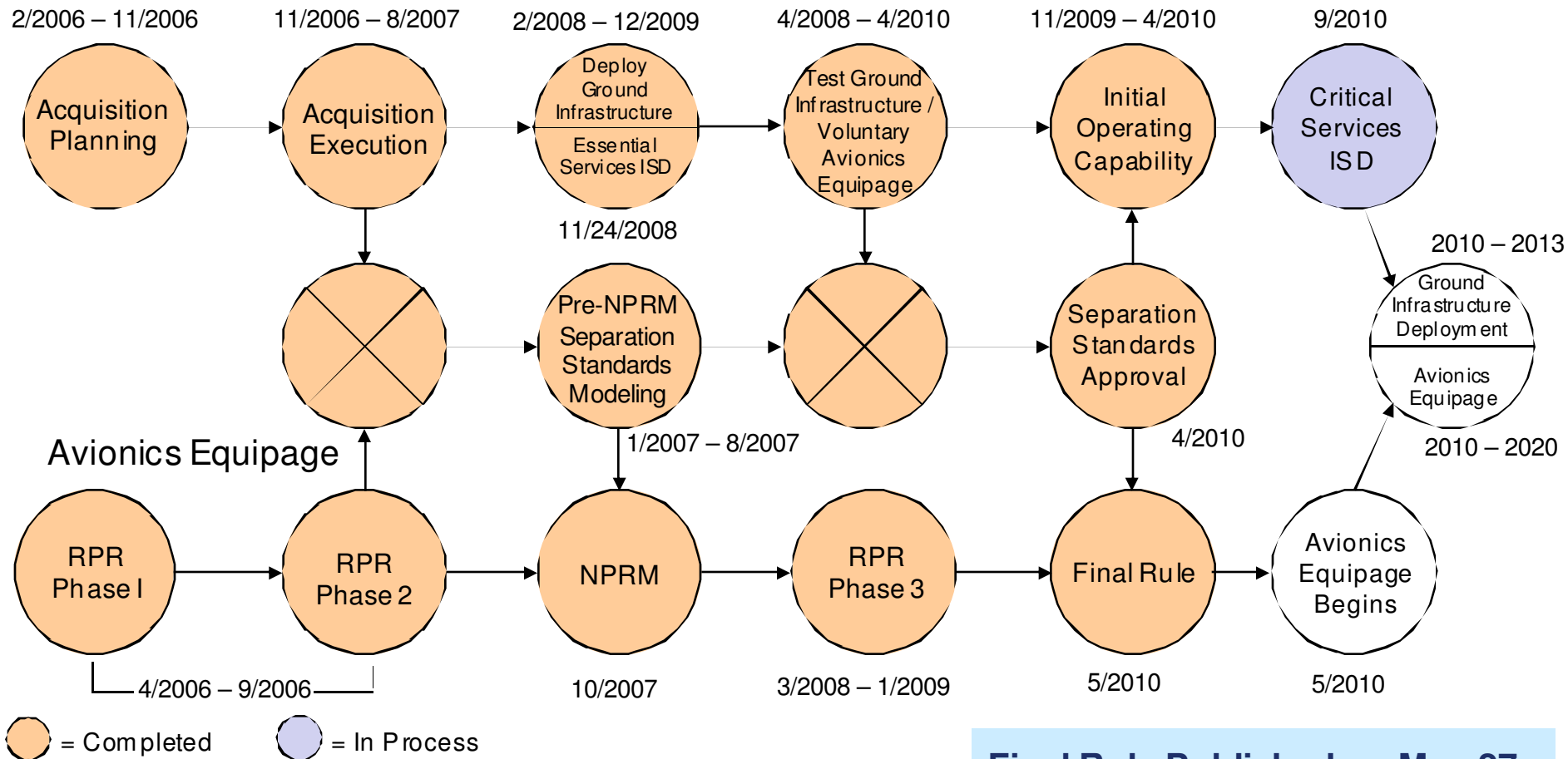
Gulf of Mexico



Philadelphia

Strategy

Ground Infrastructure



RPR = Rulemaking Project Record; NPRM = Notice of Proposed Rulemaking; ISD = In-Service Decision

Final Rule Published on May 27

Overview

- **On May 27, 2010, the FAA published the Final Rule for ADS-B Out equipage**
 - This rule mandates performance requirements for ADS-B avionics that will be required to fly in certain airspace
 - ADS-B Out transmits location information received from the Global Navigation Satellite System out of the aircraft to ADS-B ground stations and to other aircraft equipped to receive ADS-B broadcasts. The rule does not preclude other navigation source methods.
 - This rule does not mandate ADS-B In
 - A new Aviation Rulemaking Committee (ARC) will be chartered in June 2010 to address ADS-B In strategy



Dual Frequencies

- **Two frequencies have been designated for ADS-B transmissions in the national airspace system:**
 1. 1090 Extended Squitter MHz (1090ES) for commercial aircraft
 2. Universal Access Transceiver 978MHz (UAT) for general aviation and airport vehicles. This frequency is needed because of the high-bandwidth required to transmit the weather data that is most beneficial for general aviation aircraft.
- **The rule requires all aircraft flying in Class A airspace (Flight Level 180 and above) to transmit on the 1090ES MHz link**
- **The rule does not preclude aircraft from equipping with both the 1090ES MHz and 978MHz or general aviation equipping with 1090ES MHz**



Timeline

- **The final rule establishes 2020 as the date by which all aircraft flying in the designated airspace must be equipped with ADS-B Out avionics**
 - This gives aircraft owners time to determine the most cost-effective solution for the mix of aircraft in their fleets.
 - Because of the efficiencies that come with ADS-B, the FAA expects that most air-transport category aircraft will be equipped by 2015 with only stragglers waiting until the 2020 deadline

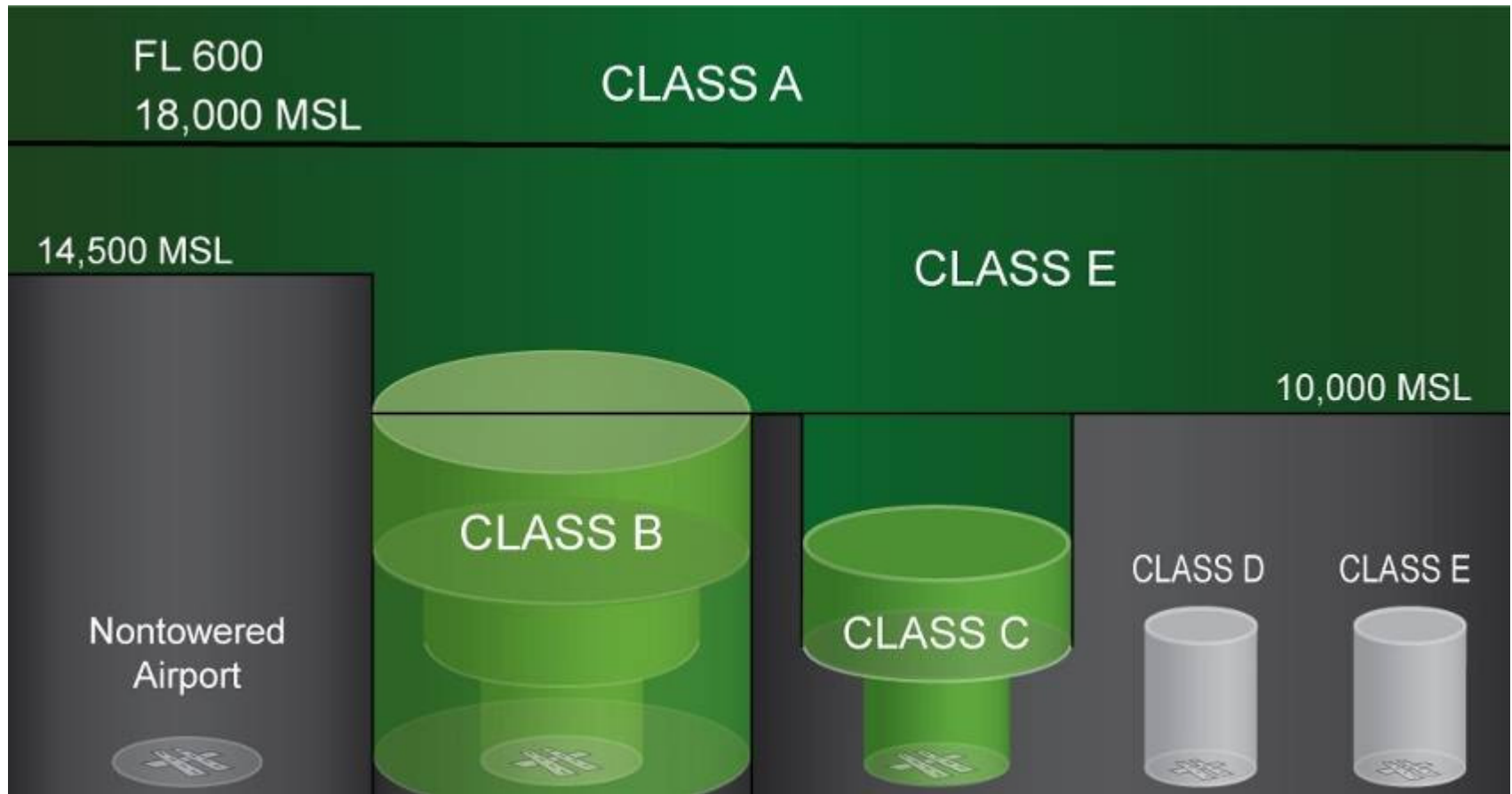


Airspace

- **ADS-B Performance is required in the following airspace:**
 - Class A, B, and C airspace
 - Class E airspace areas at or above 10,000 feet MSL over the 48 contiguous United States and the District of Columbia, excluding the airspace at and below 2,500 feet above the surface
 - Airspace within 30 nautical miles (NM) of certain identified airports that are among the nation's busiest (based on annual passenger enplanements, annual airport operations count, and operational complexity) from the surface up to 10,000 feet MSL. These airports are listed in appendix D to part 91.
 - Above the ceiling and within the lateral boundaries of a Class B or Class C airspace area up to 10,000 feet mean sea level (MSL)
 - Class E airspace over the Gulf of Mexico at and above 3,000 feet MSL within 12 NM of the coastline of the United States



Required ADS-B Airspace (In Green)



Note: 1090MHz ES link is required above FL180

Guidance Documents

- **The Technical Service Orders (TSOs) for ADS-B avionics were approved in December 2009. The final rule requires:**
 - Equipment designed to use the 1090ES frequency must meet TSO-C166b or later versions of this order; and
 - Equipment designed to use the UAT frequency must meet TSO-C154c or later versions of this order
- **Advisory Circular**
 - AC 20-165 provides installation guidance for ADS-B Out systems



Final Rule

Available at:

- <http://www.regulations.gov>

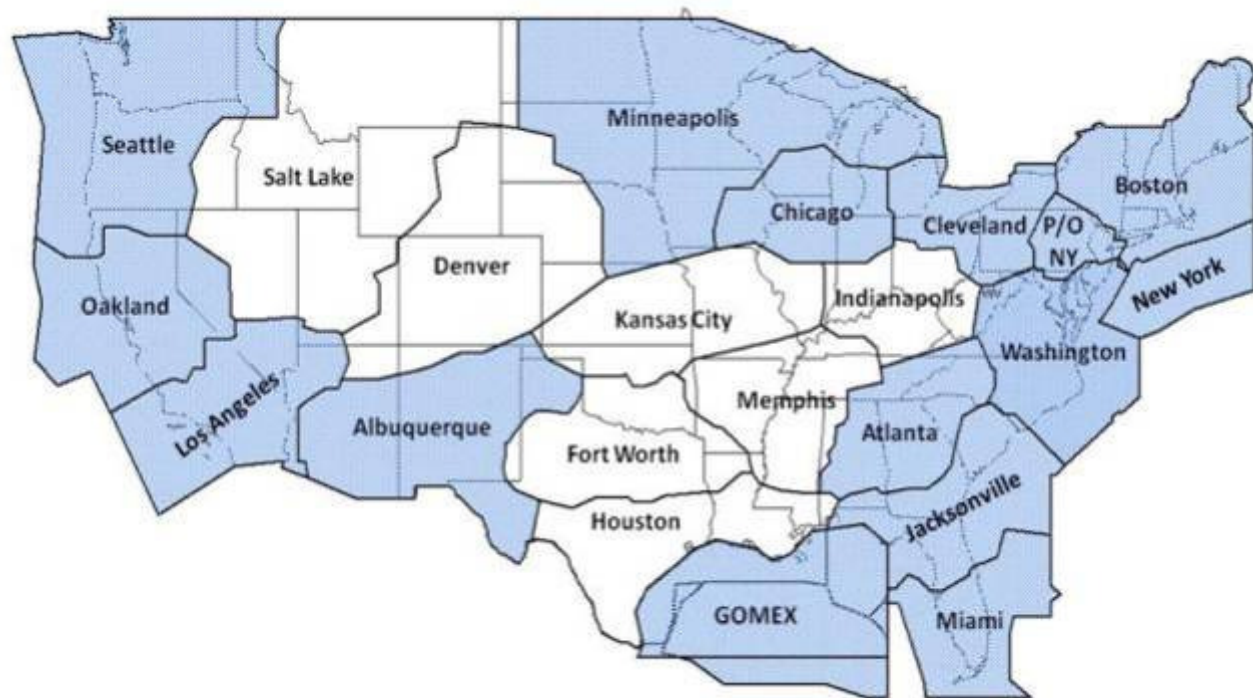
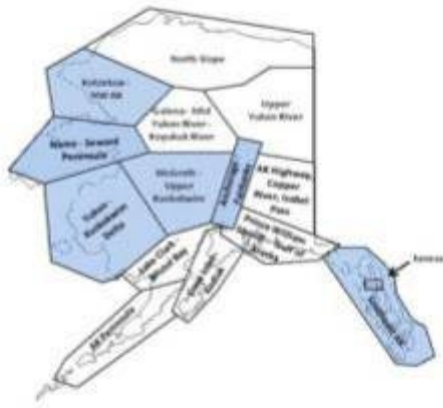
(Docket No. FAA–2007–29305; RIN 2120–AI92)

Full link:

- <http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480af5d4b>



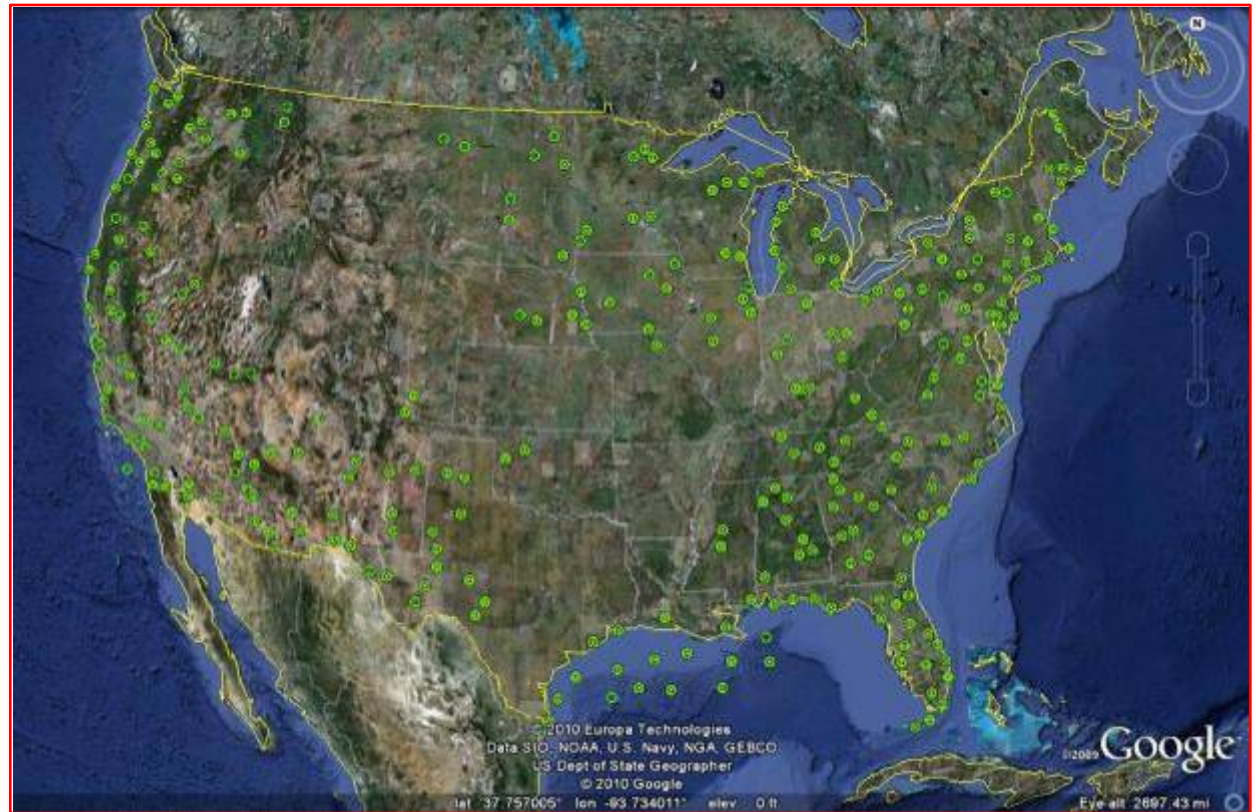
Segment 1 / Segment 2 Roll Out



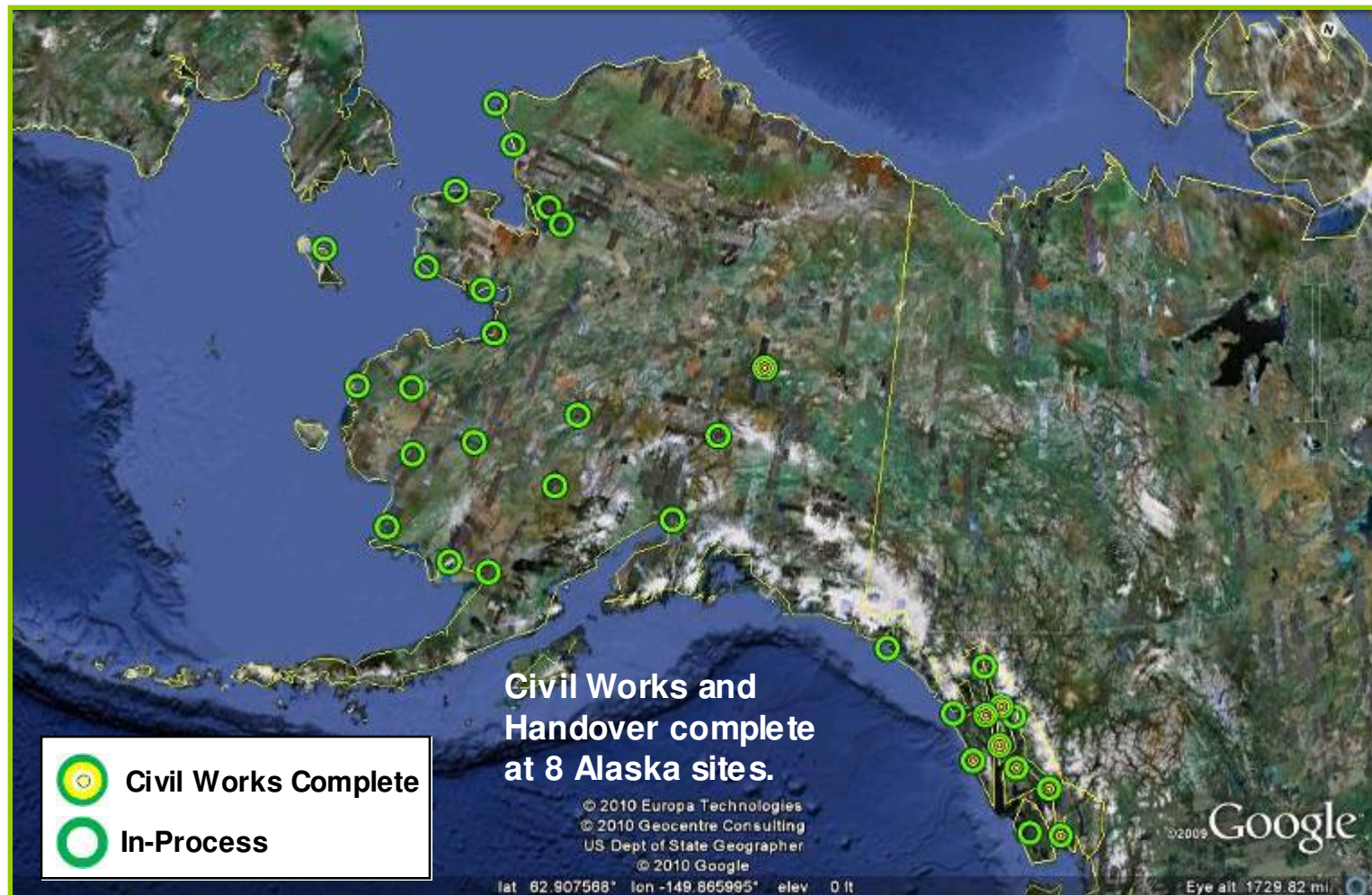
	Timeframe:	Key:
Segment 1	2007 – 2010	
Segment 2	2010 - 2014	

Implementation Status: June 7, 2010

- 321 radios planned by September 2010
- 245 sites constructed (237 in CONUS; 8 in AK)
 - 40 radio sites currently operating (ZMA, Gulf, SDF, PHL, JNU)
- 76 sites are in progress: 32 more in June; 14 in July; 30 in Aug-Sep



Alaska ADS-B Ground Station Installation



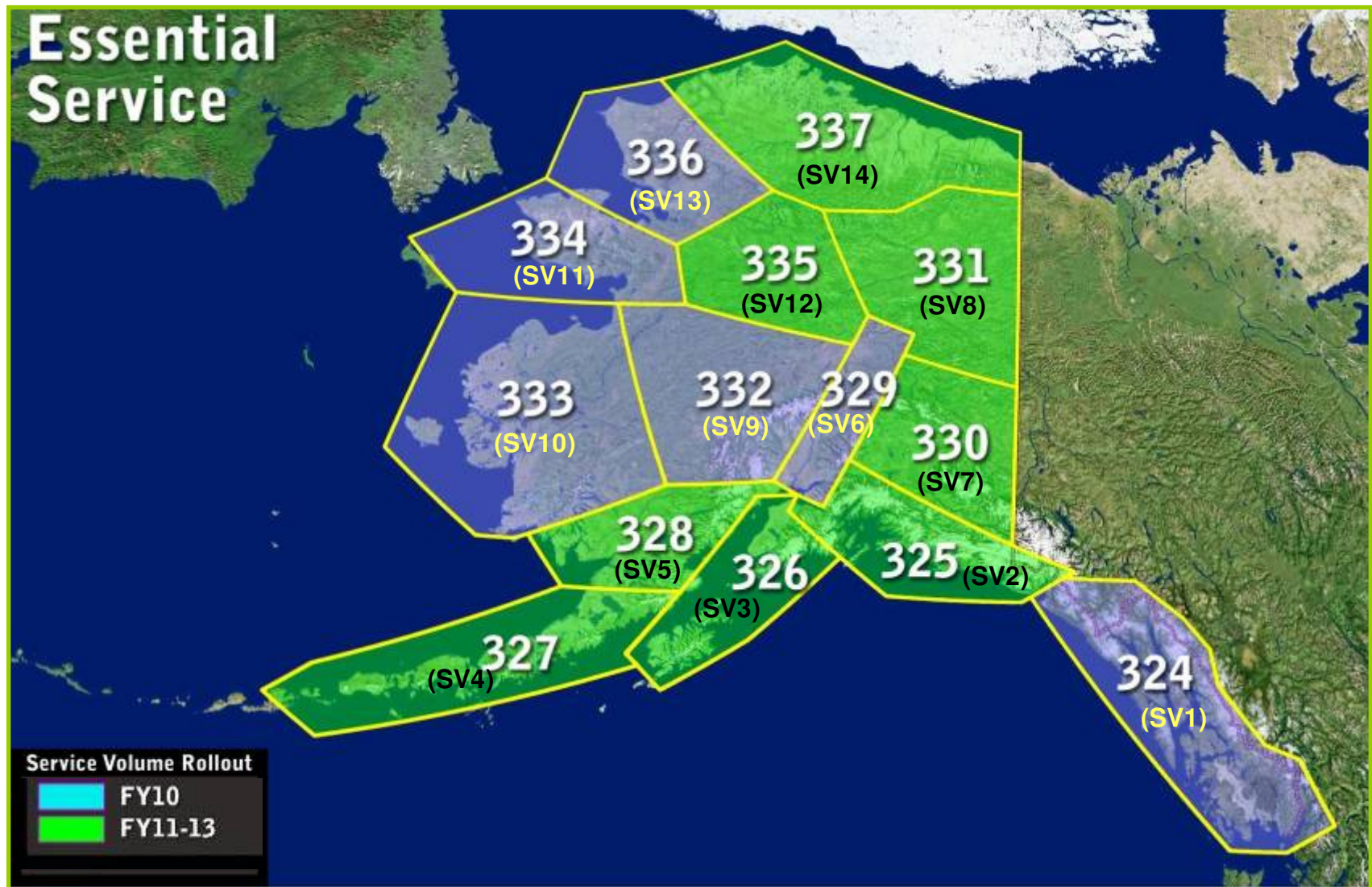
Civil Works: Site survey, design, ground station installation

Alaska Ground Infrastructure Deployment

	% Complete	Complete	Jun	Jul	Aug	Sep
SV-178 Juneau En Route	67%	2		1		
SV-324 Southeast Alaska En Route	56%	5	2		1	1
SV-329 Anchorage - Fairbanks En Route	33%	1	1	1		
SV-332 McGrath - Upper Kuskokwim En Route	0%				2	
SV-333 Yukon - Kuskokwim Delta En Route	0%		3	3	1	1
SV-334 Nome - Seward Peninsula En Route	0%		1	1	1	1
SV-336 Kotzebue - Northwest Alaska En Route	0%		1	1	2	
TOTAL	24%	8	8	7	7	3
Cumulative		8	16	23	30	33
Cumulative		24.2%	48.5%	69.7%	90.9%	100.0%



Alaska Ground Infrastructure Deployment



AWOS Update

- **Noorvik** - plant and electronics work is 98% complete. JAI for Noorvik is on hold pending availability of a circuit in ZAN. The ZAN circuits are being modified this month. JAI expected in September 2010.
- **Brevig Mission** - lease signed; building is on-site. Installation planned for June – August 2010. Power will not be available until August. The ZAN circuits are being modified this month. JAI expected in September 2010.
- **White Mountain** - lease signed, building is on-site. Installation expected in July - August. Power is available.
- **Elim** – Notice of actual construction or alteration (Form 7460) completed; building permit and lease in process. Construction is planned for 2011.





Surveillance & Broadcast Services. WSA

(W) 907-271-5780 – Program office

www.adsb.gov

Back Up



Substantive Changes in the Final Rule

Issue Area	The NPRM—	The final rule—
Technical Standard Order	Proposed performance standards as defined in TSO–C166a (1090 MHz ES) or TSO–C154b (UAT).	Requires performance standards as defined in TSO–C166b (1090 MHz ES) or TSO–C154c (UAT).
Airspace	Proposed requiring all aircraft above FL 240 to transmit on the 1090 MHz ES broadcast link.	Requires all aircraft in Class A airspace (FL 180 and above) to transmit on the 1090 MHz ES broadcast link.
	Proposed ADS–B performance standards for operations in all Class E airspace at and above 10,000 feet MSL.	Requires ADS–B performance standards for operations in Class E airspace at and above 10,000 feet MSL, excluding the airspace at and below 2,500 feet AGL.
NAC_p	Proposed a $NAC_p \geq 9$, which provides navigation accuracy < 30 meters.	Requires $NAC_p < 0.05$ NM. ($NAC_p \geq 8$)
NIC	Proposed changes in NIC be broadcast within 10 seconds	Requires changes in NIC be broadcast within 12 seconds
SIL	Proposed a SIL of 2 or 3	Requires an SDA of 2
		Requires a SIL of 3
Antenna Diversity	Proposed antenna diversity in all airspace specified in the rule.	Does not require antenna diversity.
Total Latency	Proposed latency in the position source < 0.5 seconds and latency in the ADS–B source < 1 second.	Requires uncompensated latency ≤ 0.6 seconds and maximum total latency ≤ 2.0 seconds.
Message Elements	Proposed a broadcast message element for “receiving ATC services.”	Does not require a broadcast message element for “receiving ATC services.”
An ability to turn off ADS–B Out	Proposed that the pilot be able to turn off ADS–B transmissions if directed by ATC.	Does not require the pilot be able to disable or turn off ADS–B transmissions.